

XXVII. CONTRIBUTIONS TO THE FAUNA
OF YUNNAN BASED ON COLLECTIONS
MADE BY J. COGGIN BROWN, B.Sc.,
1909-1910.

PART VIII.—EARTHWORMS.

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I received from the Indian Museum in November, 1911, four tubes containing earthworms, collected by Mr. J. Coggin Brown of the Geological Survey of India, in Yunnan and the Shan States. Of these one tube contained a single specimen, which, owing to its being sexually quite immature, was unidentifiable. The rest were all species of *Pheretima*.

PHERETIMA BROWNI, sp. nov.

A large number of specimens, all in a bad state of preservation, owing apparently to the whole of the specimens having been placed in far too small a quantity of preservative fluid.

Tengyueh, Yunnan.

EXTERNAL CHARACTERS.—*Length* 4 inches; maximum *breadth* 3 mm.; *segments* about 108. *Colour* dark brown, often with a purple tinge.

Prostomium small, prolobous.

First *dorsal pore* in the intersegmental furrow $11/12$.

Clitellum xiv—xvi=3; no trace of annulation and no setæ visible on the clitellum.

Male apertures on segment xviii, nearly one-third of the circumference apart, with 12 setæ intervening. The apertures are large, and are not situated on papillæ

Female aperture median, anteriorly in segment xiv.

Spermathecal apertures in furrows $7/8$ and $3/9$.

No *genital papillæ* or other special marks.

The setæ form a ring which is closed ventrally, and almost closed dorsally; the setæ are a little closer together ventrally than laterally and dorsally, and those of segments iv—ix are enlarged. Numbers of setæ:— $23/v$, $34/ix$, ca. $41/xiii$, $44/xix$.

INTERNAL ANATOMY.—The *septa* are so softened that it is impossible to tell which are thickened, probably $8/7$ and $7/8$, possibly also $10/11$ and $11/12$ are stouter than the rest: and $3/9$ is probably absent.

The *gizzard* occupies segments viii—ix. The *intestine* begins in xv. There are a pair of *intestinal diverticula* in xxvi; these are elongated, conical, without secondary projections; they extend forwards through segments xxv—xxiii.

The last *heart* is in segment xiii.

The *seminal funnels* are in x and xi, enclosed in small testicular sacs; the sacs of each pair are separate, not conjoined across the middle line. The *seminal vesicles* are paired, of moderate size, in segments xi and xii.

The *prostates* are of moderate size, and flattened against the body-wall; each consists of two principal lobes, one anterior, the other posterior to the origin of the duct; both lobes are divided up into numerous lobules.

The *spermathecae* possess an irregularly shaped, roughly ovoid ampulla, with a broad short duct. The diverticulum arises from near the distal end of the duct; it is variable, often coiled, thin and narrow for the most part, and dilated at its internal end; when uncoiled it is about equal in length to the ampulla or somewhat shorter.

PHERETIMA DIVERGENS (Mchlsn.) var. YUNNANENSIS var. nov.

A single specimen, in a tube along with *P. hawayana*.
Tengyueh, Yunnan.

EXTERNAL CHARACTERS.—Length $3\frac{3}{4}$ inches; breadth 3 mm., segments 108, colour yellowish brown.

Prostomium epilobous $\frac{1}{3}$.

No dorsal pores visible in front of clitellum.

Clitellum includes segment xiv—xvi=3; there are a few setæ ventrally on xvi, otherwise the clitellum is without setæ.

Male apertures on segment xviii, at an interval of nearly one-third of the circumference, in the line of the ring of setæ. About 12 setæ intervene between the apertures; there are however no setæ immediately to the inner side of these latter.

Female aperture a minute pore, mid-ventrally on xiv.

Spermathecal apertures small, in intersegmental furrows $\frac{5}{6}$, $\frac{6}{7}$, $\frac{7}{8}$, $\frac{8}{9}$ (on right side only those in $\frac{5}{6}$ and $\frac{6}{7}$ visible). The interval between the apertures of opposite sides is equal to about 11 or 12 setæ.

Genital papillæ are present on segments vii, viii and ix, in pairs, on the anterior part of the segment between the setal ring and the anterior boundary of the segment; the interval between the papillæ of each pair is equal to 7 or 8 setæ.

Midventrally, in the line of the setal rings of vi—ix and xi—xiii, there are appearances which might possibly represent faintly marked copulatory areas, but more probably are due to post-mortem changes, or to the specimen having been rubbed.

The *setæ* form closed rings. Those on the anterior segments as far back as vii or viii are enlarged somewhat, but not markedly. The intervals between the setæ are approximately the same all

round the ring. The following numbers were counted:—ca. 8^6 /vii, ca. 4^7 /xiii, 4^8 /xvii, and 50—56 in the middle region of the body.

INTERNAL ANATOMY.—*Septa* 6^6 /₆, 6^6 /₇, 7^7 /₈ are moderately thickened, 8^8 /₉ and 9^9 /₁₀ are absent, 10^{10} /₁₁ and 11^{11} /₁₂ considerably thickened, 12^{12} /₁₃ and 13^{13} /₁₄ slightly so.

The *gizzard* occupies segments viii—ix. The *intestine* begins in xvi; there is a well-marked typhlosole. A pair of large conical *intestinal diverticula* originate in xxvi.

The last *heart* is situated in segment xiii; 'blood glands' are present, a pair in each segment, along the course of the dorsal vessel on the intestine, as in *P. posthuma*.

The *nephridial system* is micronephric; the nephridia are very minute, scattered over the internal surface of the body-wall.

Testes and *seminal funnels* are enclosed in testicular sacs, of moderate size, paired, quite separate from each other, in segments x and xi. The two *vasa deferentia* of each side unite into one at the posterior boundary of xi.

The *seminal vesicles*, in segments xi and xii, are paired, of com-



FIG. 1.—Spermatheca of *Pheretima divergens* var. *yunnanensis*.

paratively small size, irregularly lobulated, with in every case a fairly distinct mesially projecting lobe.

Prostates are absent. The terminal portion of the male duct on each side is much thickened and looped.

The *spermathecae* (fig. 1) are in four pairs, corresponding to furrows 6^6 /₆— 8^8 /₉. The ampullæ are of an inverted pear-shape (the broader end below), the duct is thick and short,—one-third the length of the ampulla. From the distal end of the duct arises the diverticulum, thin and tubular for most of its extent but swollen at its proximal end; the length of the diverticulum varies; it is mostly 1^1 /₂— 3^3 /₄ as long as the ampulla and duct; the figure was drawn from one of the organs where it was even longer than the upper of these limits. In the case of the most posterior pair of spermathecae in the specimen here described, the swollen end of the diverticulum was more rounded, and not so elongated as in the rest.

Corresponding to the papillæ on segments vii, viii, and ix, there are seen on the inner side of the body wall small *accessory glands*, white and tuft-like: sessile on the body-wall (ix), or with a short thick duct (vii), or consisting of two minute tufts (viii).

The present species has not so far been recorded from India. Since in the specimen here described there are certain fairly well marked differences from the typical form,—in size, in the presence of setæ on the clitellum, in the details of the spermathecal apparatus,—it appears advisable to describe it as a separate variety.

The figure of the spermathecal apparatus may be compared with that given in the original description of the worm (Michaelsen, Arch. für Naturgesch., vol. 58, 1892), the gizzard is there said to occupy segments ix—x, and the hearts to be situated in segments x—xii.

PHERETIMA HAWAYANA (Rosa).

This species has been previously described under a number of different names (*cf.* Beddard, Proc. Zool. Soc. Lond., 1900, p. 645), from many different countries. The species is apparently a variable one, and one form, previously described separately as *P. barbadensis* (Bedd.), but included in *P. hawayana* by Beddard in the paper just referred to, is considered by Michaelsen to have the value of a subspecies (Michaelsen, Mem. Ind. Mus., vol. I, No. 3, 1909, p. 187).

I give a fairly complete description of the specimens in the present collection, since they are of interest from the fact that they are in some ways intermediate between the typical form of *P. hawayana* and the subspecies *barbadensis*, and hence help to confirm Beddard's view as to the specific identity of the two.

Six specimens, in a tube with a single specimen of *P. divergens* var. *yunnanensis*.

Tengyueh, Yunnan.

EXTERNAL CHARACTERS.—Length 2—4 inches; breadth 3—4 mm.; segments 88—90. Colour of most of the specimens a dirty yellowish brown.

Prostomium epilobous $\frac{1}{2}$; sometimes with a transverse fissure in addition completing the anterior boundary of segment i, *i.e.* a combined prolobus and epilobous condition.

First dorsal pore in intersegmental furrow $\frac{10}{11}$.

Clitellum includes segments xiv—xvi=3; without setæ.

Male pores on xviii, $\frac{2}{7}$ of the circumference apart on small or very small papillæ.

Female pore on xiv, mid-ventral, in a transversely extended depression.

Spermathecal apertures three pairs, in furrows $\frac{5}{6}$, $\frac{6}{7}$, $\frac{7}{8}$.

Genital papillæ, etc.—Internal to the male apertures on segment xviii, and either in the same transverse line with them or at a slightly posterior level, were a number of small pigmented spots, either one or two on each side. These had, except in one case, the character of depressions; in only the one exception was the spot a papilla. When more than one spot was present, they were separate, not fused.

In one specimen a pair of small papillæ, each with a darker centre, was present on the posterior part of segment vii, nearly in the groove $7/4$, and slightly median to the position of the spermathecal apertures.

The *setæ* formed an unbroken ring; they were slightly closer together ventrally than dorsally; those of segments iii—viii were enlarged. The following numbers were counted:— $44/ix$, $49/xi$, $56/xii$, $64/xix$, $66/xxvii$.

INTERNAL ANATOMY.—*Sepia* $5/6$ and $6/7$ moderately thick, $7/4$ considerably thickened, $8/9$ and $9/10$ absent, $10/11$ — $12/13$ somewhat thickened.

Intestinal diverticula small, conical, originating in segment xxvii; in one specimen there were one (right side) or four (left) small rounded secondary diverticula on the ventral border of the primary diverticula.

Small *testicular sacs*, completely separated, in x and xi; *vesiculæ seminales*, irregularly lobulated in xi and xii.

Prostates large, in six segments (xvii—xxii), divided up into a corresponding number of lobes by the septa. A thick yellow duct, with an S-shaped curve, rises from the middle portion of the gland in segment xix, the vas deferens joins the gland anterior to, but near, the origin of the prostatic duct.

Accessory prostates correspond in position to the genital spots on segment xviii.

The *spermathecae* are three pairs; the ampulla is ovoid in shape, narrowing gently to the duct, which is of considerable length, three-quarters as long as the ampulla. The diverticulum is often coiled; it is a narrow tube which when uncoiled equals the ampulla in length in some cases, while in others it is only two-thirds or one-half as long.

An *accessory gland* was present on each side in the specimen which possessed the papillæ posteriorly on segment vii; the glands corresponded in position with these papillæ, and were sessile on the inner face of the body-wall.

Remarks.—Writing of Beddard's inclusion of *P. barbadensis* with *P. hawayana* Michaelsen [says:—“I am not yet quite convinced that this view is correct. Till now I have not seen a specimen—and I have examined many—which aroused any doubt as to whether it should be placed in the typical form or in the subsp. *barbadensis*. In the generally more robust typical form with stronger *setæ* in the anterior part of the body the papillæ near the male pores are always united at each side, occupying an oblong oval area medial from the male pores and mostly somewhat oblique. In the subsp. *barbadensis* the papillæ near the male pores are scattered, partly very near the male pores, partly near the median ventral line.”

In the present specimens the dark spots near the male apertures had as a rule the character of slight depressions rather than of papillæ; they were not confluent, and in this respect resembled the papillæ of the subsp. *barbadensis* rather than those

of the typical form. But the setæ of the anterior segments were stronger than those of the remaining segments, which Michaelsen, in the passage just quoted, gives as a characteristic of the typical form.

In the '*Tierreich*' (Oligochaeta, 1900) Michaelsen describes the two forms as separate species. In the fact that the setæ are disposed in an unbroken chain, and that the clitellum occupies the whole of three segments, the present form agrees with *P. barbadensis*; while in having secondary diverticula from the intestinal cæca, and a curved prostatic duct, it resembles *P. hawayana*. Occupying thus an intermediate position, it serves to confirm Beddard's view of the unity of these two species.

PHERETIMA POSTHUMA (L. Vaill.).

A number of specimens, mostly mature.

Ye-nan-Gyaung, Magwe, N. Shan States, Upper Burma.